

William Feller

Mathematician **Vilim (William) Feller** (July 7, 1906 – January 14, 1970) is remembered as the author of the most successful probability textbook ever written. It has been claimed that the modern era of probability began with Feller's *Introduction to Probability Theory and Its Applications* (1950), with all subsequent introductory texts measured against it. Gian-Carlo Rota, Feller's colleague at Princeton University, described the treatise as one of the great masterpieces of mathematics of all time.



Feller was born in Zagreb, Croatia, the son of a successful businessman. According to Rota, Feller's last name was "a Slavic tongue-twister," which he changed while still a university student and his first name was originally Willibold. The name change, at the urging of Richard Courant, was necessary because of his Jewish background and the coming of power of the Nazis. Feller was educated at home by private tutors until he entered the University of Zagreb, where he studied mathematics and received his first degree in 1925. He earned his doctorate from the University of Göttingen in 1926 and was habilitated in 1928 as an assistant professor of mathematics at the University of Kiel where he remained until 1933.

When Hitler came to power Feller left Germany. He continued his career in Copenhagen, and in 1934 moved to the University of Stockholm where he joined the probability group. Five years later he moved to the United States, as a professor of mathematics at Brown University and in 1944 became a U.S. citizen. The next year he accepted a professorship at Cornell University, and five years later, he moved to Princeton University where he remained until 1962.

Feller published 104 papers and frequently revised and improved his definitive two-volume textbook by including new procedures. An interesting story of the book's influence concerns Persi Diaconis, who dropped out of school at age 16 to undertake a career as a magician. He successfully pursued his craft for eight years until by fate he came across a copy of Feller's book, but found he could not read it. Diaconis enrolled at New York City College at night to learn enough mathematics to understand the material and in 1974 he earned a doctorate. He currently is the Mary Sunsen professor, Department of Statistics and professor of mathematics at Stanford University where he is a world-renowned probabilist.

According to Rota, "[Feller's] lectures were loud and entertaining. He wrote very large on the blackboard, in a beautiful Italianate handwriting with lots of whirls. Sometimes only the huge formula appeared on the blackboard during the entire period; the rest was hand waving. His proofs – insofar as one can speak of proofs – were often deficient. Nonetheless, they were convincing, and the results were unforgettably clear after he had explained them. The main idea was never wrong. He took umbrage when someone interrupted his lecturing by pointing out some glaring mistake. He became red in the face and raised his voice, often to full shouting range. It was reported that on occasion he had asked the objector to leave the classroom. The expression 'proof by intimidation' was coined after Feller's lectures (by Mark Kac)."

Feller believed that the traditional emphasis placed on averages meant that too little attention was paid to random fluctuations. Much of his study of probability theory concentrated on Markov processes, named after the Russian probabilist Andrei Andreevich Markov. A Markov process is a random series of actions whose future probabilities are determined by most recent events and are independent of past events. A Markov chain is a sequence of random values whose probabilities at a time interval depend

upon the value of the number at a previous time. A simple example of a Markov chain is a random walk, where the walker may not return to the location just vacated. Feller showed how these tools could be applied in areas where probability theory had not previously been used. He believed that one should always have a concrete model to think about when dealing with abstract mathematical structures.

Many concepts in probability are named for Feller, including: Feller transition functions, the Feller test for explosions, Feller semi groups, Feller Brownian motions, the Lindeberg-Feller theorem, and the Feller property. He was the first executive editor of the leading mathematical abstracting journal *Mathematical Reviews*. In 1970 he was awarded the highest American honor, the National Medal of Science. Unfortunately, he died shortly before the award ceremony so the medal was presented to his widow Clara at the White House on February 16, 1970.

Quotation of the Day: “All possible definitions of probability fall short of the actual practice.” –
William Feller